

# Waterproof spray-induced lung injury while using a heater

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## Key message

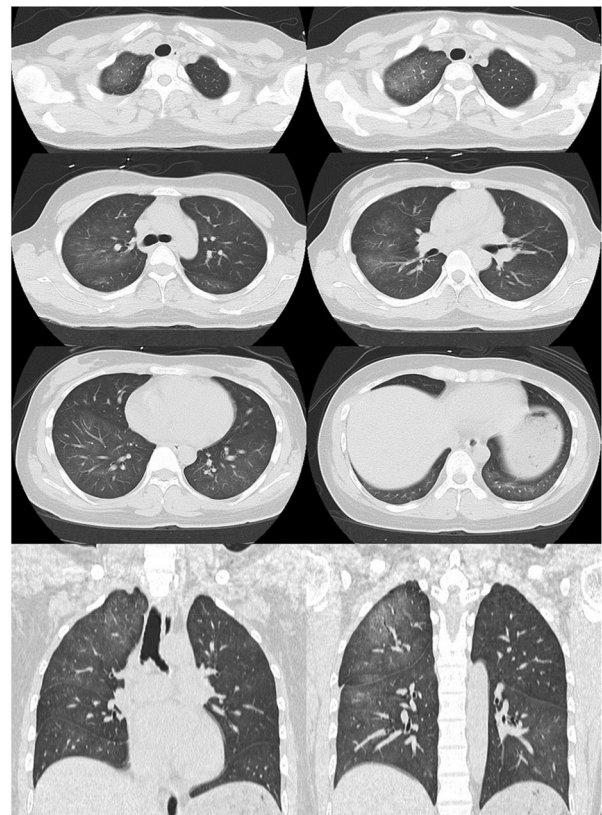
Fluoresin in waterproof spray becomes a pyrolysis product due to the heat of tobacco as well as a heater and can cause lung injury. People should be aware that waterproof spray must not be used under these circumstances.

## KEYWORDS

heater, lung injury, waterproof spray

## CLINICAL IMAGE

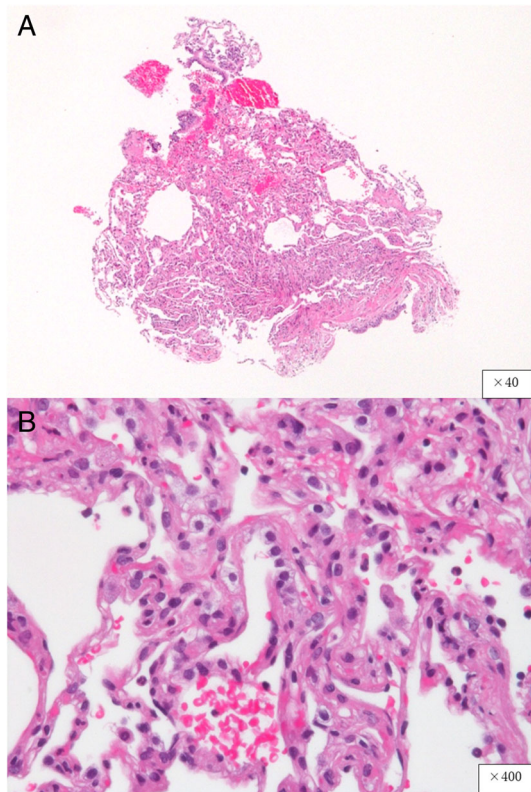
A 32-year-old non-smoker man developed non-productive cough, dyspnoea and headache 1 h after using waterproof spray (200 ml) near a heater in a closed room. The waterproof spray contained fluoro-resin, silicone and n-heptane. He visited our hospital. His body temperature was 37.7°C, his oxygen saturation was 95% (room air) and he was hyperventilating. Chest computed tomography (CT) revealed bilateral diffuse ground-glass attenuations (Figure 1). Lung biopsy showed mild inflammation (Figure 2). Bronchoalveolar lavage fluid showed increased total cell counts ( $4.9 \times 10^5/\text{ml}$ ) with macrophages (58%), neutrophils (35%) and lymphocytes (6%); no bacteria were cultured. His non-productive cough, dyspnoea, and bilateral diffuse ground-glass attenuations on CT improved 8 days, without treatment, except for methylprednisolone (125 mg only once), which was administered on the first day (Figure 3). Lung injury caused by waterproof spray is strongly associated with smoking because the spray contains fluoro-resin, which becomes a pyrolysis product due to the heat of tobacco and becomes toxic when inhaled.<sup>1</sup> The internal temperature of a heater is higher than the set temperature, and it is considered that this temperature is sufficient to produce the pyrolysis product of fluoro-resin. Few cases of



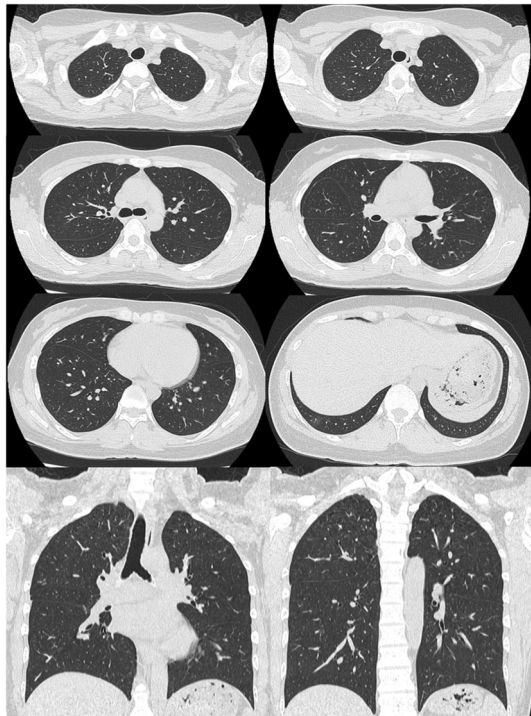
**FIGURE 1** Chest computed tomography on admission. Diffuse ground-glass opacities spared on the peripheral side are found in both lung fields

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**FIGURE 2** Transbronchial lung biopsy tissue specimens of low-power field (A) and high-power field (B) on the day after the inhalation of fluorescein. Swelling of the alveolar epithelium is observed. Inflammatory cell infiltration is mildly present



**FIGURE 3** Chest computed tomography on the seventh day of hospitalization, which is the day of discharge. Almost all diffuse ground-glass opacities were improved

spray-related lung injury while using a heater are reported. Physicians should know that injury can occur with heater usage as in smoking.

#### CONFLICT OF INTEREST

None declared.

#### ETHICS STATEMENT

Appropriate written informed consent was obtained for publication of this case report and accompanying images.

#### AUTHOR CONTRIBUTIONS

Yasuyuki Higashi and Takeshi Orihashi are responsible for the conception or design of the work, and the acquisition, analysis or interpretation of data for the work. Kei Yamasaki is responsible for drafting the work or revising it critically for important intellectual content. Kazuhiro Yatera is responsible for final approval of the version to be published.

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